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Process for Finalizing the Active Layer Cap Design for the RM 10.9 Removal Area

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The active layer design included in the Pre-Final Design Report is considered an interim step for the final design as it is based on non-site-specific input parameters to the CapSim model. The Pre-Final Design's chemicals of concern (COCs) pore water concentration input parameters were estimated by calculation (i.e., EqP method), which can overestimate freely dissolved aqueous concentrations by several orders of magnitude. As a result, the design's active layer thickness is likely considerably thicker than necessary for even a conservatively designed active layer. The Pre-Final active layer design is also based on a dissolved organic carbon (DOC) pore water concentration and groundwater flux that are believed to be conservative, but have not been measured at the site.

The Pre-Final active layer design serves as an interim step that has allowed the CPG to proceed with bidding and contracting the project without delaying the project schedule. Utilizing the Pre-Final cap design has also allowed the CPG to obtain competitive pricing for placing the cap. The CPG's intent is to collect the relevant site-specific data (i.e., COCs pore water concentrations and groundwater flux) and utilize these site-specific data to refine and finalize the active layer cap design, and revise the capping portion of the contract based on the refined design. The Final Design will evaluate and select a specific type and thickness of adsorbent to be used for the RM 10.9 active layer. The potential adsorbents to be evaluated may include SediMite, AquaGate composite pellets containing activated carbon, activated carbon-filled Reactive Core Mats, and other forms of carbon such as crushed anthracite coal incorporated into the sand layer. The cap is scheduled for placement following dredging beginning in late August/early September 2013.

Sampling and analysis of RM 10.9 sediments for determining site-specific pore water concentrations are currently underway. The data are anticipated to be available in late March 2013. A site-specific measurement of the Darcy Velocity (groundwater flux) input parameter will be determined through seepage tests to be conducted in April 2013, which is earliest the seepage testing contractor is available.

The table below summarizes the key input parameters to the CapSim model for which site-specific data will be obtained.

TABLE 1
Key CapSim Model Input Parameters
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Key CapSim Model Input Parameters	Non-site-specific Input	Site-specific Input
Pore Water Concentration		
2,3,7,8-TCDD	0.0015 µg/L	TBD
PCB-52	0.067 µg/L	TBD
Phenanthrene	41.8 µg/L	TBD
Dissolved Organic Carbon (DOC)	20 mg/L	TBD
Darcy Velocity	1,000 cm/yr	TBD

In the absence of allowable risk-based COC concentrations in the cap above the active layer, the performance criteria for the active layer are based on the more conservative length of time before breakthrough of a COC through the active layer. The length of time for breakthrough for the RM 10.9 cap will be chosen to be greater than 250 years for dioxins/furans and PCB-52. (Note: PCB-52 is representative of mobile PCB congeners and is also one of the most prevalent PCB congeners measured within the RM 10.9 Removal Area.) The thickness of different

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active layer materials required to provide the required breakthrough protection will be compared, and a recommendation will be made based on the efficacy of each material, including an evaluation of the ability to place the required materials in the required thickness.

The table below summarizes the performance criteria for the active layer design.

TABLE 2
Active Layer Performance Criteria
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	Active Layer Performance Criteria (CapSim-Modeled Time to Breakthrough)
Contaminants of Concern	
2,3,7,8-TCDD	>250 years
PCB-52	>250 years
Mercury	>250 years
Long-term Monitoring Indicator Compound	
Phenanthrene	<250 years

Mercury is also expected to exceed the 250 years to breakthrough criterion based using the mercury concentrations calculated at its solubility limit as mercuric chloride and a known partition coefficient for mercury onto activated carbon. Mercury speciation will be determined as part of the pore water sampling and analyses. If the amount of methyl mercury is a negligible portion of the total mercury, as anticipated from data collected during the RI, further evaluation of mercury is not needed.

The detection of phenanthrene is proposed in the Pre-Final Design Report for use as a breakthrough indicator as part of the long-term cap monitoring program. Phenanthrene is easier to detect and more mobile than the other COCs. Thus, phenanthrene will be used as the conservative indicator (i.e., shortest breakthrough) to indicate possible cap breakthrough well ahead (more than 100 years) of any actual breakthrough by dioxin/furans or PCBs. Other PAHs could also be used as breakthrough indicators as long as they are more mobile than dioxins/furans and PCBs.

Active Layer Design Steps
1) Determine actual pore water concentrations
2) Determine actual pore water Darcy velocity (utilize conservative values initially and test sensitivity of model to Darcy velocity until seepage test data is available)
3) Rerun CapSim Model with actual data
4) Identify active cap layer material options
5) Run CapSim Model to predict breakthrough for various thicknesses and configurations of active cap materials
6) Screen CapSim Model predictions for breakthrough of no less than 250 years for 2,3,7,8-TCDD, PCB-52, and mercury
7) Identify optimal thickness and configuration of active cap layer material resulting in a breakthrough of no less than 250 years
8) Consider installation feasibility in recommending thickness of active layer